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(54) **Cleaning and sanitising tablets manufactured by direct compression**

(57) A cleaning and sanitising composition in tablet form comprises a disinfecting or sanitising agent (such as a dichloroisocyanurate), a surfactant (such as sodium lauryl sulphate, polyethylene glycol, sodium dodecyl benzene sulphonate or a natural source material derived from defatted soya beans) and a base material. The base may be non-effervescent or effervescent base. An effervescent base comprises anhydrous sodium sulphate, sodium bicarbonate and an acid source such as a combination of fumaric acid and maleic acid.

The additives have cohesive and lubricant properties which enable the tablets to be manufactured by *direct compression* methods, without any pretreatment of any of the tablet components.

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"A Cleaning and Sanitising Composition"

The invention relates to a composition for cleaning and sanitising purposes.

5 According to the invention there is provided a cleaning and sanitising composition in tablet form comprising a disinfecting or sanitising agent, a surfactant and a base material which are formed into a tablet by a dry compression process.

10 The tablet may also include a water softening, sequestering agent or soil suspension agent/builder.

In one embodiment of the invention the sterilising agent is a halogen source, preferably a chlorine and/or bromine source. Where the sterilising agent includes a chlorinating agent preferably the chlorinating agent is a chlorinated  
15 isocyanurate which may be present with or without an added bromine source.

Typically the disinfecting or sanitising agent is present in an amount of between 2.5 and 60% by weight of the tablet.

In a particularly preferred embodiment of the invention the tablet includes an admixture of polyethylene glycol and sodium lauryl sulphate which provides exceptional cohesive and lubricant properties to enable the manufacture of tablets by direct compression methods, without any pretreatment (eg wetting, drying, emulsifying, granulating) of any of the tablet components. It has been found that an admixture of powdered sodium lauryl sulphate, with an active matter of approximately 89% (mmw303) when mixed with polyethylene glycol, of an average molar mass between 1300 and 3,700 and more preferably 1500, in a ratio of between 0.1:1 and 1.5:1 and more preferably 0.9:1 provides a tablet of excellent physical characteristics when pressed on high speed rotary tabletting machines, without any picking, dragging, chipping, capping or laminating of the tablet. The two materials are also compatible with each other and other active tabletting materials such as the chlorinated isocyanurates, sequestering agents and soil suspension agents, and also with effervescent bases. The mixture of sodium lauryl sulphate and polyethylene glycol will typically comprise between 5% and 80% of the finished tablet weight and preferably between 50% and 70% for non-effervescent tablets and 25% to 35% for effervescent tablets.

In another embodiment the tablet includes an admixture of a high active, predominantly straight chained alkyl benzene sulphonate and a natural source material derived from defatted

soya beans, typically containing 80% high molecular weight polysaccharides when blended together with other materials which may include sequestering agents, chlorinated isocyanurates and an effervescent base, are compressible by  
5 direct compression means without any pretreatment (eg wetting, drying emulsifying, granulating) of any of the tablet components. The tablets are of excellent physical characteristics when pressed on high speed rotary tableting machines, without any picking, dragging, chipping, capping or  
10 laminating of the tablet. The two materials are compatible with each other and are also compatible with the other tableting materials. The mixture of the alkyl benzene sulphonate and the material derived from defatted soya beans will comprise of between 5% and 80% and preferably between 15%  
15 and 30% of the finished tablet.

In one embodiment of the invention the composition includes a sequestrant in combination with a surfactant. Preferably the sequestrant comprises sodium tripolyphosphate. Most preferably the tripolyphosphate is present in an amount of  
20 approximately 10% by weight.

In a preferred embodiment of the invention the weight ratio of the disinfecting or sanitising agent to the surfactants is from 10:1 to approximately 1:10.

In one embodiment of the invention the base is non-effervescent. In another embodiment of the invention the base is effervescent. The rate of effervescence and solubility may be controlled by variation of the effervescent base components, by weight. The base material may comprise anhydrous alkali metal sulphate such as anhydrous sodium sulphate which may be present in an amount of from 2% to 15%, most preferably approximately 5% to 10% by weight. Preferably the base material also includes an alkali metal bicarbonate, particularly sodium bicarbonate which is present in an amount typically of between 5% and 30% most preferably approximately 20% to 28% by weight.

Preferably, the base also includes an acid source which is typically between 5% and 30%, most preferably approximately 18% to 26% by weight of the tablet. The acid may comprise adipic acid or a combination of fumaric acid and maleic acid in a weight ratio from 6:1 to 1:1.

The invention will be more clearly understood from the following description thereof given by way of example only.

#### 20 EXAMPLE A

To form a tablet having both disinfecting or sanitising and surfactant properties, the following ingredients are mixed together and subsequently compressed into tablet form.

No pretreatment of any of the materials, other than the mixing of the dry materials, is necessary prior to compression.

A tablet without an effervescent base material was formed by mixing the following ingredients and compressing them using a dry compression process.

Sodium dichloroisocyanurate	1.70 kg
Sodium lauryl sulphate	0.12 kg
polyethylene glycol	0.17 kg
Sodium tripolyphosphate	0.01 kg

10 A batch of tablets of 20 grams weight was produced from these ingredients.

The change in pH when the tablets were added to tap water at a pH of 6.81 and a temperature of 14°C was monitored and the following results obtained.

15	<u>TIME</u>	
	(minutes)	pH
	0	6.81
	10	5.72
	20	5.64
20	30	5.62
	40	5.63

The tablets had a hardness of at least 15kg were approximately 15mm thick and had a finished weight of approximately 20 grams.

EXAMPLE B

- 5 A tablet having an effervescent base may be formed from the following ingredients:

	sodium dichloroisocyanurate	42.7% by weight
	sodium lauryl sulphate	8.2% by weight
	polyethylene glycol	6.0% by weight
10	sodium tripolyphosphate	0.3% by weight
	adipic acid	18.8% by weight
	anhydrous sodium sulphate	4.3% by weight
	sodium bicarbonate	19.7% by weight

- 15 The ingredients may be mixed and then compressed together by a direct compression process without the use of any pretreatment, other than the mixing of the dry materials, prior to compression

- 20 Instead of adipic acid, a combination of fumaric acid and maleic acid to a total percentage of approximately 18% to 26% by weight may be used. The use of fumaric acid as an aliphatic carboxylic acid in the composition produces a tablet having an acceptable appearance, and having suitable

properties regarding storage and solution time. However, fumaric acid alone generally requires a long reaction time. The addition of maleic acid however, produces a synergistic effect and allows the reaction to proceed more vigorously. Thus, a controlled effervescent and solution time can be achieved by using a combination of fumaric and maleic acid.

The anhydrous alkali metal sulphate particularly sodium sulphate acts as a pH buffer and also acts as a water scavenger and so reduces the sensitivity of the tablets to moisture so that they can be stored for long periods without degradation. The sodium sulphate will also assist soil suspension.

Sodium lauryl sulphate and polyethylene glycol act as surfactants and also as binding and lubricating agents.

#### 15 EXAMPLE C

A tablet having an effervescent base may be formed from the following:

	<u>% by weight</u>
Sodium dichloroisocyanurate	5.25%
20 Sodium dodecyl benzene sulphonate	18.50%
Sodium tripolyphosphate	7.50%
Sodium bicarbonate	27.00%



Sodium sulphate	11.00%
Adipic Acid	25.75%
Emcosoy (by Mendell)	5.00%

The ingredients may be mixed together and then compressed  
5 together by a direct compression process without the use of  
any pretreatment, eg wetting, emulsifying, drying,  
granulating, prior to compression. The above tablets were  
4gms finished weight and displayed excellent physical  
characteristics with no chipping, capping, dragging picking or  
10 laminating, with a hardness greater than 8kg. Dissolution was  
achieved in 5 mins to 8 mins in water of between 40°C and 25°C  
without agitation. The pH of the resultant solution of one  
tablet in 2.5 litres was approximately 5.8 after 15 mins. The  
solution produced a high foam suitable for catering use (for  
15 example) without streaking of glassware or crockery.

EXAMPLE D

	Sodium dichloroisocyanurate	10% by weight
	Sodium dodecyl benzene sulphonate	22% by weight
	Sodium tripolyphosphate	10% by weight
20	Adipic Acid	25.4% by weight
	Sodium bicarbonate	26.6% by weight
	Sodium sulphate	5.8% by weight
	Tartrazine (colour)	0.2% by weight

The ingredients were dry blended and then compressed together on a high speed rotary press by a direct compression method process without the use of any pretreatment such as wetting, emulsifying, drying or granulating, prior to compression.

- 5 Tablets were compressed using 15.8mm punches to a finished weight of 1 gramme without any chipping, capping, dragging, picking or laminating. A hardness of greater than 8kg was achieved and a dissolution of less than 5 minutes in 280mls (¼ pint) at 40°C to 45°C.
- 10 The sodium dichloroisocyanurate provides at least 200ppm available chlorine in hand held spray guns of 280ml capacity used for hard surface disinfection in the catering/janitorial segments. The inclusion of a compatible surfactant (sodium dodecyl benzene sulphonate) and sequestrant (sodium
- 15 tripolyphosphate) allows the disinfecting and cleaning in a one step operation in a uniform dosage form.

EXAMPLE E

	Sodium dichloroisocyanurate	5.15% by weight
	Sodium dodecyl benzene sulphonate	17.18% by weight
20	Sodium hexametaphosphate	0.17% by weight
	Sodium tripolyphosphate	9.81% by weight
	Emcosoy (by Mendell)	4.42% by weight
	Adipic Acid	27.84% by weight
	Sodium bicarbonate	29.10% by weight

Sodium sulphate

6.33% by weight

As before, the ingredients were dry blended and compressed on a high speed rotary compression machine by a direct compression process, without any pretreatment. The tablets  
5 were compressed to a finished weight of 8 grammes, using 25mm punches. Tablets of excellent physical properties were produced.

The sodium dichloroisocyanurate provides at least 50ppm available chlorine in 4 litres of water. The sodium dodecyl  
10 benzene sulphonate and sodium hexametaphosphate combine to produce sufficient detergency for washing crockery for example, and retaining good foam stabilisation. Sodium tripolyphosphate provides sequestration. The unit dose format provides for disinfection and detergency in a uniform, one  
15 step operation.

The composition of the invention may include any suitable lubricants selected from one or more of the following which may be used alone or in combination.

Sodium benzoate  
20 Sodium acetate  
Magnesium lauryl sulphate  
Talc  
Cetyl alcohol

Ethylene oxide polymer (e.g. Polyox WSRN-10)

Sodium chloride

Leucine

Carbowax 4000

5 Mannitol

For increased wetting, foaming and increased biocidal activity surfactants would preferably be anionic or nonionic in character. A surfactant may be selected from one or more of the following alone or in combination.

10 Sodium lauryl sulphate - anionic

Polyoxyethylated glycols - nonionic (low foaming)

Organic phosphate esters

Sodium alkyl naphthalene sulphonates

Polyethylene glycol (also good lubricant)

15 Sodium dioctyl sulphosuccinate

Alkyl aryl sulphonates (eg sodium dodecylbenzene sulphonate - (anionic)

Alkyl phenol ethylene oxide polymer  $R \text{---} \text{C}_6\text{H}_4 \text{---} \text{O} \text{---} (\text{C}_2\text{H}_4\text{O})_n$

Any suitable water softening/sequestering agent may be used  
20 which may be selected from one or more of the following used either alone or in combination.

Sodium tripolyphosphate

ZEOLITE <sup>®</sup>

The tablets according to the invention which have combined sanitising and detergent properties may be used in a wide variety of applications. For example, they may be used for cleaning and disinfecting water treatment facilities such as cooling towers and the like, in janitorial, medical, animal hygiene, dental applications, for cleaning blood spillages and the like in a medical environment, in the food processing and catering industry, or in a wide range of other similar applications.

- 5
- 10 The invention is not limited to the embodiments hereinbefore described which may be varied in detail.

CLAIMS

1. A cleaning and sanitising composition in tablet form comprising a disinfecting or sanitising agent, a surfactant and a base material which are formed into a tablet by a dry compression process.  
5
2. A composition as claimed in claim 1 wherein the sterilising agent is a halogen source.
3. A composition as claimed in claim 2 wherein the halogen source is a chlorine and/or bromine source.
- 10 4. A composition as claimed in claim 3 wherein the chlorine source is a chlorinated isocyanurate.
5. A composition as claimed in claim 4 wherein the chlorine source is sodium dichloroisocyanurate.
- 15 6. A composition as claimed in any preceding claim wherein the surfactant is an anionic or nonionic surfactant.
7. A composition as claimed in claim 6 wherein the surfactant comprises one or more of:-

Sodium lauryl sulphate

Polyoxyethylated glycols

Organic phosphate esters

Sodium alkyl naphthalene sulphonates

Polyethylene glycol

Sodium dioctyl sulphosuccinate

5 Alkyl aryl sulphonates, and

Alkyl phenol ethylene oxide polymer.

8. A composition as claimed in claim 7 wherein the surfactant comprises one or more of:-

Sodium lauryl sulphate

10 Alkyl aryl sulphonates, particularly sodium dodecyl benzene sulphonate,

Sodium hexametaphosphate, and

Polyethylene glycol.

9. A composition as claimed in claim 8 wherein the surfactant comprises an admixture of polyethylene glycol and sodium lauryl sulphate.
- 15

10. A composition as claimed in claim 9 wherein the weight ratio of sodium lauryl sulphate to polyethylene glycol is from 0.1:1 to 1.5:1.

- 20 11. A composition as claimed in claim 10 wherein the ratio is approximately 0.9:1.

12. A composition as claimed in any of claims 9 to 11 wherein the admixture comprises between 5% and 80% by weight of the tablet.
13. A composition as claimed in claim 12 wherein the tablet  
5 is non effervescent and the admixture comprises from 50% to 70% by weight of the tablet.
14. A composition as claimed in claim 12 wherein the tablet is effervescent and the admixture comprises from 25% to 35% by weight of the tablet.
- 10 15. A composition as claimed in any of claims 1 to 8 wherein the tablet includes an admixture of a predominantly straight chained alkyl benzene sulphonate and a natural source material derived from defatted soya beans.
16. A composition as claimed in claim 15 wherein the weight  
15 ratio of alkyl benzene sulphonate and natural source material is from 6:1 to 2:1.
17. A composition as claimed in claim 16 wherein the ratio is approximately 3.7:1.
18. A composition as claimed in any of claims 15 to 17  
20 wherein the admixture comprises from 5% to 80% by weight of the tablet.



19. A composition as claimed in claim 18 wherein the admixture comprises from 15% to 30% by weight of the tablet.
20. A composition as claimed in any preceding claim wherein  
5 the composition includes a sequestrant in combination with a surfactant.
21. A composition as claimed in claim 20 wherein the sequestrant comprises sodium tripolyphosphate.
22. A composition as claimed in claim 21 wherein the sodium  
10 tripolyphosphate is present in an amount of approximately 10% by weight.
23. A composition as claimed in any preceding claim wherein the weight ratio of disinfecting or sanitising agent to surfactant is from 10:1 to 1:10.
- 15 24. A composition as claimed in any preceding claim wherein the base includes anhydrous alkali metal sulphate in an amount of from 2% to 15% by weight.
25. A composition as claimed in claim 24 wherein the metal  
20 sulphate is present in an amount of from 5% to 10% by weight.

26. A composition as claimed in claim 24 or 25 wherein the metal sulphate is anhydrous sodium sulphate.
27. A composition as claimed in any of claims 24 to 26 wherein the base material includes an alkali metal bicarbonate.
- 5
28. A composition as claimed in claim 27 wherein the bicarbonate is present in an amount of from 5% to 30% by weight.
29. A composition as claimed in claim 28 wherein the bicarbonate is present in an amount of from 20% to 28% by weight.
- 10
30. A composition as claimed in any of claims 27 to 29 wherein the bicarbonate is sodium bicarbonate.
31. A composition as claimed in any of claims 24 to 30 wherein the base material includes an acid source in an amount of from 5% to 30% by weight.
- 15
32. A composition as claimed in claim 31 wherein the acid source is present in an amount of from 18% to 26% by weight.

33. A composition as claimed in claim 31 or 32 wherein the acid source is adipic acid.
34. A composition as claimed in claim 31 or 32 wherein the acid source comprises a mixture of fumaric acid and maleic acid in a weight ratio of from 6:1 to 1:1.
35. A composition as claimed in any preceding claim including one or more of a water softening agent, a sequestering agent, a soil suspension agent, or a lubricant.
36. A composition substantially as hereinbefore described with reference to the examples.

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